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RESEARCH PAPER

Electronic marketplaces under conditions of oligopsony and relational marketing – an empirical exploration of electronic agricultural markets in India

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Abstract
Benefits of electronic marketplaces across diverse, largely consumer-facing, competitive industries have been in the form of lower transaction costs, transparent price discovery, and improved coordination. This article explores the benefits of electronic marketplaces under oligopsony, which generally encompasses relational marketing as well. With producer – first handler agricultural markets as the context, the article draws from literature on electronic marketplaces, transaction costs, and seller-buyer dependence. Based on survey data, an exploratory factor analysis is conducted to understand the elements of relational marketing between farmers and traders. Subsequently, transaction costs of marketing in a physical agricultural marketplace are compared with those in its electronic counterpart. Results did not indicate significant reduction in transaction costs in the e-marketplaces. Reasons for such findings are logically deduced to be a consequence of opportunistic traders not sharing marketing-related information with farmers, notwithstanding dependence of the latter on traders for such informational needs. Implications for policymakers, third-party electronic marketplace providers are discussed for the specific context, besides indicators for similar other market structures.

Keywords Electronic marketplaces · Oligopsony · Agricultural marketplaces · Developing countries · Relational markets

JEL Classification M31 O33 H80 Q02

Introduction

Whereas electronic markets have been around since the 1940s (Henderson, 1984 as cited in Fong et al., 1997), they registered impressive growth in the 1990s and 2000s primarily due to availability of broadband to access the Internet. After 2010, this growth was driven by proliferation of mobile communication (Adamson, 2016). Besides a decisive role played by infrastructure and institutions, acceptance and adoption of e-commerce could be linked to its role in reducing transaction costs, abating information asymmetry, enhancing transparent price discovery, and altering market structures because of disintermediation (Lee & Clark, 1996; J. Y. Bakos, 1997; Strader & Shaw, 1997; Y. Bakos, 1998). It is indicated that consumers prominently gained from e-commerce through low prices as businesses were able to reduce production and transaction costs (Freebairn, 2001).

E-commerce is common in industries as diverse as retailing, travel and tourism, employment and job market, banking and insurance, stock trading, entertainment, on-demand service delivery and so on (Turban & King, 2003). Even for goods that are usually variable in quality, such as farm produce, e-commerce is not entirely novel and there are instances of commodity exchanges and online auctions (Goldstein & O'Connor, 2000). Yet, e-commerce in primary farm produce markets presents a unique context, since such markets are usually oligopsonies, marked

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by the presence of a few large-sized buyers, who resort to non-price competition, evade competition through collusive behavior, and differentiate by offering fringe services to sellers, often adversely affecting their interests (AmosWEB Encylconomic, 2020). Additionally, transactions in such markets are generally governed by strong interpersonal relations, and buyers enjoy greater bargaining power by possessing asymmetric market information. Among other shortcomings, high transaction costs leading to inefficiency are prominent in these markets (Barrett & Mutambatsere, 2008; Negi et al., 2018). Under such situations, electronic trading systems help to create "an efficient centralized market", which can facilitate information exchange between the spatially dispersed marketplaces, leading to improved market efficiency (Sporleder, 1984, p. 861).

Seemingly, this logic prompted policymakers to apply concepts of e-commerce to agricultural markets. The e-National Agriculture Market (eNAM) by the Government of India, taken up in 2016 is an example of an e-marketplace for farm commodities. It envisages the creation of a nationally integrated market for agricultural commodities, which is expected to benefit farmers by enabling better access to buyers in distant markets, transparent and real-time price discovery, and faster payments (Department of Agriculture Cooperation & Farmers' Welfare, 2021). However, success of such initiatives depends on how farmers perceive usefulness of these developments, and adopt them.

This study assumes importance for two major reasons. Firstly, success of agricultural EMPs (Ag-EMPs) holds potential to improve the lot of smallholders in developing countries, particularly in producer – first handler markets, where geographic segregation of marketplaces usually affects access to larger markets and buyers. Secondly, though there are several studies involving farmers and e-commerce, such as in B2B settings and export markets (such as, Cloete & Doens, 2008; Leroux et al., 2001a, 2001b; Manouselis et al., 2009); purchase of goods and services by farmers (such as Henderson et al., 2004; Jin et al., 2020; Patel et al., 2016); adoption of e-commerce tools by farmers (such as Jamaluddin, 2013; Zapata et al., 2016); or barriers to adoption of e-marketplaces (Ellawala & Sachitra, 2021), the influence of market structure (oligopsony) and buyer–seller relations (farmers' dependence on traders) presents a relatively unexplored area.

Drawing theoretical support from the Technology Acceptance Model (TAM) proposed by Davis (1989), we frame the research question as:

> Do farmers perceive usefulness of the Ag-EMP in an oligopsonistic market where farmer-trader relations often underlie market transactions?

Based on earlier research in the EMP domain, we hypothesize that:

(a) Farmers perceive a reduction in transaction costs in an Ag-EMP than in a conventional physical marketplace
(b) Farmers perceive improved marketing efficiency, in an Ag-EMP against a physical marketplace.

We expect to find reasons for perceptions of usefulness (or the lack of it) from the factors determining farmer-trader relations, and provide managerial directions for appropriate interventions. Our findings might have relevance in other comparable market structure situations, where small entrepreneurs sell undifferentiated, and non-standardized goods.

This paper is structured as follows. The next section reviews literature on agricultural marketplaces, highlighting the prevalence of oligopsony and relational marketing, the evolution of agricultural policy towards Ag-EMPs, and describing the Ag-EMP under study based on EMP literature. Thereafter, literature on effect of EMPs on transaction costs, and specifically for farm commodity situations, is reviewed. The third section positions the context theoretically in the TAM framework and develops the research question and hypotheses. The fourth section covers data and methods, analysis, results, and discussion thereof. We present implications for managers and policy, contribution of the paper, and its limitations, followed by the conclusion.

Literature review

Agricultural marketplaces – oligopsony, relational marketing and e-marketplaces

Agricultural commodity markets for farmers, such as rural assembly or wholesale markets, are distinctively geographically dispersed, nationally numerous, but locally limited in number (Sporleder, 1984, p. 859). Here, farmers are typically "at the mercy of oligopsonies, collusion, and monopsony" (Lanzillotti, 1960, p. 1240), where "competitive sellers facing oligopsonistic buyers" are at the receiving end of better-informed buyers (Sporleder, 1984 p. 861). The Indian agricultural marketing system is representative of such markets, as it comprises of over 20,000 rural periodic markets, and more than 7,000 regulated market yards or Agricultural Produce Marketing Committee (APMC) yards, where millions of farmers sell their produce to numerous spatially segregated buyers. Other marketing arrangements such as contract farming and cooperatives also exist, but are sporadic and not mainstream (Agriculture Division, 2011, p. 37). Typically, farmers take their produce to the APMC market yard, where commission agents canvas amongst licensed buyers or traders on behalf of farmers, in addition

to providing handling, cleaning and grading services during the transaction. Buyers purchase the produce through open auction or other approved mechanisms, and the winning bid gets title to the auctioned lot. The buyer is supposed to make full payment to the farmer as also commission to the agent as a percentage of the price (Ministry of Agriculture, 2003). Despite their apparent significance as marketplaces for farmers, the APMC market yards are marked by high costs of information search, and transportation (Negi et al., 2018). Also, commissions, sampling losses, and weight discounting make up a bulk of costs during the process of sale, raising the cost of accomplishing a market transaction (R. K. Sinha & Ranjit, 2010).

Broadly, the shortcomings of the APMC system of agricultural markets could be attributed to the market structure. Rogers and Sexton (1994) theorized that the buyer concentration in primary agricultural markets is much higher than in markets for related finished products, lending them the hue of oligopsony, though the phenomenon is not specific to farm commodity markets. Additionally, farm commodities being bulky and perishable, restrict farmers geographically to buyers or markets close to the production area. This gives buyers a greater degree of power over sellers (Rogers & Sexton, 1994). Buyers in an oligopsony have been found to avoid competition, and resort to collusion and cartelization. Competition, when evident, is in the form of non-price mechanisms such as provision of fringe benefits to sellers, than based on price (AmosWEB Encylconomic, 2020). Several studies highlighted the prevalence of such practices in primary agricultural markets and farm commodities (for instance, Bergman & Brannlund, 1995; Durham & Sexton, 1992; Goodwin, 1994). Specific to APMC market yards, research has demonstrated that they turned oligopsonistic over the decades due to obstructive practices adopted by traders (such as cartelization), eventually leading to weak governance and corruption (Acharya, 1998, p. 6; Chand, 2012, p. 55).

While oligopsony restricts the set of buyers available to farmers in a physical APMC, it is observed that farmers in reality engage with a further smaller subset of buyers. Commercial relations between farmers and traders are frequently influenced by traditional networks, neighbourhood effects, and kinship (Subramanian & Qaim, 2011). In regulated markets, farmers sell to large-holder farmers (who double up as commission agents) due to reciprocal relations arising out of traditional networks (S. Sinha, 2020). Informality is commonplace as deals are struck through dyadic negotiations; there are hardly any invoices or bank checks, and quality of produce is evaluated subjectively. Moreover, farmers take into account bundled services offered by traders, which smoothens the selling process and also reinforces trust (Kareem Abdul et al., 2012). Such practices strengthen preference for personalized trading relations and informal contracts, which are, ironically, more economical than accessing and availing formal contracts (Fafchamps & Minten, 1999). This relationship between entrepreneurial farmers and traders marked by trust, commitment, services, and longstanding informal association, indicates a sense of relational marketing. Gundlach and Murphy (1993) highlighted that transactions between two parties in relational marketing occur over extended periods, accompanied by high investments in the relationship and high switching costs. Where the exchange involves social and economic aspects, the outcomes are typically complex involving multidimensional interdependence (p. 31). Buyer–seller exchanges may be construed to have entered the realm of relational marketing when they have prolonged interdependence, "performance is less obvious, uncertainty leads to deeper communication…and expectations of trustworthiness may be cued by personal characteristics" (Dwyer et al., 1987, p. 12).

Against this background, the Government of India, in 2016, visualized creation of a nation-wide, single, integrated virtual market for farm commodities (Agriculture Division, 2011, p. 16). A report identifies the benefits of this virtual marketplace as "transparent prices…reducing the cost of intermediation, improving market efficiency and producers' realization, coupled with reduction in consumer price paid" (Agriculture Division, 2011, p. 64). The precursor to this project was the Unified Market Platform (UMP) initiative in the southern Indian state of Karnataka in 2014 (Chand, 2016, p. 17), which managed to electronically connect 162 wholesale markets for 60 commodities (REMS Pvt Ltd, n.d.) by 2017–18. In the agricultural EMP, farmers, commission agents and traders first register themselves on an online portal, after which they are eligible to conduct transactions. When a farmer comes to the market yard, his personal information, commodity, mode of transport, and details of the commission agent are entered. The lot is then prepared for sale by weighing, sampling and assaying, following which traders bid for the lots online. At the end of the auction process, traders issue a bill and make payment online. This model of the agricultural EMP draws theoretical support from Sporleder's argument of a common electronic marketplace to enhance market efficiency.

Conceptualizing the Ag-EMP through the lens of EMP literature assumes importance for theoretical, managerial and analytical relevance. Wang and Archer (2007) identified nine classes of EMPs, broadly divided on the bases of strategies adopted by the participants on the EMP, and strategies adopted by operators of EMPs, besides a third angle based on level of centralization. Accordingly, EMPs could be classified based on number of participants, the nature of relationship between the transacting parties, behaviour of transacting parties, ownership structure of the EMP, industry scope, mechanism of market exchange, standardized versus

differentiated products, power structure, and fee structure. This classification facilitates examining EMPs from the perspectives of governance or business models; which find roots in disciplines such as microeconomics, marketing or supply chain management. Given such complexity and variety, Wang and Archer suggested that an EMP may be defined with relevance to the context. Definition-wise, the EMP under study is broadly an information system that plays the role of an intermediary between buyers and sellers, essentially to facilitate exchange of products and prices (J. Y. Bakos, 1991, 1997). Thus, the Ag-EMP could be described as one where entrepreneurial small farmers sell on a many-to-few, market-oriented, platform that is owned and regulated by a neutral third-party (government) agency, with auction as the common transaction mechanism, for undifferentiated products. In terms of centralization, the Ag-EMP is a virtual location where buyers and sellers remotely access the electronic system.

Transaction costs in e-marketplaces

Myriad business models including e-auction, e-procurement, third-party EMPs, value chain aggregator models, and so on are manifestations of e-commerce (Timmers, 2006). A common thread across all such e-commerce business models is the influence of the electronic medium in reducing transaction costs. Wang et al. (2006) reported that greater reach leading to reduced search costs for trading partners was an important factor in facilitating adoption of EMPs. For instance, easier identification of potential suppliers in the online medium helped corporate buyers in reducing search costs (Benslimane et al., 2005). Similarly, Strader and Shaw's (1997) inductive analysis suggests that e-markets benefit buyers, sellers and supporting organizations by lowering costs of search, production, and market transactions by enabling better market reach, and improved payment systems.

Besides facilitating easier reach among trading partners, e-commerce models also lower costs of information search. Bakos (1997) highlighted the role of EMPs in disseminating price, and price-product information in commodity and differentiated product markets respectively. Wu and Lee (2005) deduced that real-time information exchange with customers and suppliers, faster customer reach, and improved customer communication resulted from e-communication. In tourism, e-communication led to greater trust between travel agents and their suppliers, strengthening reciprocity between the two parties, and positively impacting the travel agent's commitment to the supplier (Andreu et al., 2010).

In addition to information and trading partner search costs, e-commerce enabled decline in costs on other fronts as well. Garicano and Kaplan (2001) demonstrated that Internet-based auctions for used cars reduced business process costs, resulting in higher marketplace benefits. Likewise, web auctions lowered entry barriers for market participants, brought down transaction fees and commissions, and enhanced transparency in product information and the trading process (Klein & O'Keefe, 1999). According to Lee and Clark (1996), while e-brokerages and e-auctions mitigated costs of search and price discovery, e-markets aided efficiency through disintermediation. Effectively, e-commerce adoption comes across as a technological change for an organization aimed to control production and distributive costs (Freebairn, 2001).

E-commerce-led transaction cost mitigation has been observed in the agribusiness sector as well. Commodity exchanges are among the most successful examples of e-markets dealing with farm produce (Alt & Klein, 2011 p. 45). Van Heck and Ribbers (1997) stated that electronic interventions in the famous Dutch flower auction delineated information from the physical aspects of trading, leading to improved efficiency. Baourakis et al. (2002) proved that agricultural firms were motivated to adopt e-commerce to enter foreign markets, and reduce costs of transactions and communications. In South Africa, firms engaged in seed, grain, and wines used e-commerce, whereas exporters and retailers of farm produce preferred their own electronic exchanges for a very high proportion of their procurement (Cloete & Doens, 2008). The Internet helped lower transaction costs in China's B2B agricultural vegetable trading market (Xiaoping et al., 2009).

Extending this logic of EMPs to "producer—first handler agricultural markets", Sporleder (1984) argued that scale-constrained small producers in spatially segregated submarkets could benefit from electronic trading by expanding geographical reach, heightened competition among buyers, greater information openness, and improved price discovery mechanisms. These changes potentially lead to improved pricing efficiency, higher prices for sellers, and reduced overall costs of transacting in the market.

Theoretical grounding and hypotheses development

Policymakers of Ag-EMPs profess the benefits of the EMP in terms of greater transparency and lower transaction costs to farmers, leading to systemic efficiency. While such benefits are desirable and have potential to be replicated in other developing countries, a lot depends on farmers' perception of usefulness of the Ag-EMP. For farmers, this would be akin to adoption of a technological change for their farm enterprise and, to cite Freebairn (2001), the Ag-EMP ought to help reduce their distributive costs. The Technology Acceptance Model (TAM) proposed by Davis (1989) provides a suitable theoretical background for such investigation. TAM has been used in farm settings in the past to understand adoption of

technology by farmers (for instance, Flett et al., 2004; Folorunso & Ogunseye, 2008; Islam & Grönlund, 2012; Verma & Sinha, 2018), establishing the appropriateness of the model for the current inquiry.

In his seminal paper, Davis (1989) discussed multiple and diverse strands of research to establish perceived usefulness as one of the influencers of adoption of technology. One such paradigm of research draws from cost–benefit studies based on behavioural decision theory. Davis highlighted that early research in the cost–benefit paradigm adopted objective constructs for accuracy and effort, which attracted criticism for the subjectivity involved in such decisions. This criticism was addressed by separating the perceived costs and benefits of a decision from the actual decision made. The core model proposed by Davis was modified in subsequent studies by adding antecedents to the constructs or making other enhancements. However, perceived usefulness remains a basic determinant of technology adoption in most of these frameworks. Against this background, we presume based on literature reviewed in the prior sections, that lower transaction costs is a perceived benefit of EMPs, and the same is expected in the Ag-EMP. However, unlike other markets, the present context is underlined by oligopsony and relational marketing. Accordingly, we develop the research question as:

> "Do farmers perceive reduction in transaction costs in the Ag-EMP, which exists in a market structure defined by oligopsony and transactions governed by relationship between farmers and traders?".

The research question is operationalized by hypothesizing that the Ag-EMP leads to perceived reduction in transaction costs. We thus arrive at the first hypothesis:

> H_1: Transaction costs perceived by farmers in marketing of farm produce in an Ag-EMP are lower than those in a physical marketplace.
> Simultaneously, there exists a possibility that adoption of Ag-EMP may involve additional expenditure. However, the virtual marketplace could bring in greater buyer participation, leading to higher competition and better prices that could more than offset the increased costs. In other words, the Ag-EMP could lead to increased marketing efficiency. Thus, we frame the second hypothesis as:
> H_2: Marketing efficiency perceived by farmers in marketing of farm produce in an Ag-EMP is higher than in a physical marketplace.

Data and methods

Farmers' marketing methods vary across commodities and geographies. Farmers also have different avenues for marketing, such as sale at farm gate, at a local periodic market, to itinerant traders, or representatives of licensed traders, or contractual arrangements. Hence, it was necessary to sample farmers who sold similar commodities, involving marketing at regulated markets or APMCs, within a specific time period and geography for equivalence in costs and prices. Further, it was also important that one sample had to sell at an EMP which was operational for at least a year, assuming that this would have made farmers conversant with the technology at least to some extent. Accordingly, two APMCs in Karnataka state in southern part of India – Raichur and Haveri—were shortlisted. The two markets dealt in a common commodity, cotton. Raichur represented the physical or conventional agricultural marketplace and Haveri represented the Ag-EMP. When the survey was conducted, the Ag-EMP had been in operation for over a year. Villages were identified based on inputs of officials at the market yards and some knowledgeable farmers. It was suggested to shortlist villages within a radius of 30 km of the marketplace for two reasons – one, farmers within this distance invariably sold cotton at the marketplaces mentioned above, and two, transporters charged a flat transportation rate up to a distance of 30 km, the fare varying only based on the quantity. Accordingly, villages along prominent district roads within a 30 km distance of the marketplaces were considered for the survey. Within this superset, villages growing cotton as a major crop were identified with local help, and around 120 farmers in these villages were contacted, under each of the two districts. The sampling frame comprised of any farmer who belonged to the above set of villages, and having sold cotton at the identified marketplaces, aligned with the objective of the paper. The survey was planned to sample not more than 10 farmers in a village, such that cotton provided more than half of their total income from agriculture. Accordingly, actual number of farmers surveyed in a village ranged between two and 10. A brief description of the overall sample is presented in Table 1 below. A structured questionnaire was administered to elicit information about relationship of farmers with the buyers and the costs of executing the marketing transaction, beginning with preparing the goods for marketing through receiving the full payment. The response rate in the survey for Haveri was 85%, while that for Raichur was 82.5%.

Measures for relational marketing and transaction costs

Although the section on agricultural marketplaces substantially indicates the prevalence of relational marketing, comprehending the factors that determine farmer-trader relations in the given context is important because of immense subjectivity in marketing practices and norms in different marketplaces across India. Therefore, literature on power-dependence in marketing channels, and farmer-trader relations

Table 1 Sample characteristics

Parameter	Category	Districts	
		Haveri (Ag-EMP)	Raichur (Physical marketplace)
Age of the farmer	Up to 25	3	3
	26 to 40	47	49
	41 to 60	34	37
	61 and above	18	10
Area under cotton (hectares)	Up to 1 hectare	33	15
	1.01 to 2 hectares	38	36
	2.01 hectares and above	31	48

was reviewed to investigate into relational marketing. Prior research on dependence in marketing channels highlights that buyer–seller relations are defined by factors such as trust, commitment, manufacturer's share in channel member's sales and profits, role performance of channel member and so on (Frazier et al., 1989; Geyskens et al., 1996). From farmers' perspective, relations with buyers are defined by exclusivity or partnership (Hingley & Lindgreen, 2002), moral norms (Lyon & Porter, 2009), kinship, reciprocity, and neighborhood effect (Subramanian & Qaim, 2011).

From the above studies, items used to measure the constructs were borrowed with suitable modification, where required, to adapt to the agrarian context. Kumar et al. (1995) described commitment as buyers' expectation of continued relationship with supplier for a long time. They defined trust using two other constructs – honesty and benevolence. Items were borrowed from Kumar et al.'s study and appropriately modified. Subramanian and Qaim (2011) used the word kinship to imply "individuals belonging to the same caste" (p. 696). However, the word kinship has been used variously in different works. Sahlins (2011) elaborated the numerous connotations "kinship" has, and when viewed broadly as "mutuality of being", it extends beyond relations by blood to include relations arising out of common work too. Therefore, "kinship" in this study includes caste, and also social networks such as belonging to the same village or region. Pervan et al. (2009) described reciprocity in relationship marketing as one party providing favours or making allowances to the other party to derive similar allowances or favours in future. Linking this with the more contextually closer study of Subramanian and Qaim (2011) three items were drawn up to measure reciprocity. Informational and marketing support services were more direct and their operationalization was done from insights obtained during a preliminary pilot survey. The operationalized measurement variables of relationship determinants are presented in Table 2.

Transaction cost economics has been used in a plethora of inquiries into corporate organizational types, market structures, contracting, vertical integration, corporate governance, institutions, as well as public policy (Williamson, 1998). North and Wallis' (1994) description of transaction costs as "the costs of land, labour, capital, and entrepreneurial skill required to transfer property rights from one person to another" (p. 612) conforms better with marketing, which is an activity of economic exchange. While there are different methods of calculating transaction costs, Hobbs'(1997) approach provides greater ease of operationalization. In Hobbs' study, search costs referred to costs of finding information about product, price and trading partner, which were considered to have usually incurred before the transaction happened. Negotiation costs included those incurred during the actual transaction, and monitoring costs referred to post-transaction costs, comprising enforcement of the terms of transaction. This approach was adopted in earlier studies on transaction costs in agribusiness (for instance, Gong et al., 2006; Ndoro et al., 2015). Hence, a similar technique was followed, and economic and financial costs of transaction were included to analyse marketing transactions by farmers. Search costs were identified as the monetary value of time spent in obtaining price and buyer information. Farmers did not spend time in actively finding the price of a commodity, and instead obtained it during informal discussions with fellow farmers or traders, in person or on phone. The cost was negligible and hence not included in the analysis.[1] Since the commission agent canvassed for the farmer among traders, his commission was recorded as buyer search cost. In cases where farmers directly interacted with buyers, the time spent in such activity was considered under buyer search costs. All expenses for packing, transport, loading–unloading, weighing, quality testing, and wastage were included

[1] These insights were gathered while conducting a pilot study before embarking on the actual survey.

Table 2 Measurement Variables of Farmer – Trader Relations

Relationship determinants	Measurement variables
1. Trader as a source of market information	1.1 Reliable information on current and future prices of commodity 1.2 Requirements of and changes in market and downstream buyers 1.3 Crop production technology information
2. Marketing support by trader	2.1 Grading and sorting facilities 2.2 Provision of packing material 2.3 Arrangement of transport to market
3. Credit provided by trader	3.1 Provision of loan for cropping 3.2 Provision of loan for personal purposes 3.3 Loans at lower interest rates than other informal sources 3.4 No requirement of collateral / pledge 3.5 Provision of loan for emergencies
4. Kinship	
4.1 Ethnicity	4.1.1 Trader hails from same village / region as farmer
4.2 Communal / caste preferences	4.2.1 Trader is a member of same caste / community as farmer
5. Reciprocity	5.1.1 The trader is an elected representative at some level of governance
5.1 Political influence	5.2.1 Trader helps with availing government schemes
5.2 Assistance with government work	5.2.2 Trader helps with work related to government departments
6. Trust	6.1.1 Fairness in assessing quality of produce
6.1 Honesty of trader	6.1.2 Appropriate methods of weighing produce
6.2 Benevolence of trader	6.1.3 Promptness in payment 6.1.4 Is fair when payments are staggered 6.2.1 Fair in getting best possible price 6.2.2 Believes in prosperity of the farmer and his family
7. Commitment of trader	7.1 Believes in continued future, mutually beneficial relationship

Table 3 Classification and measurement of transaction cost components

Cost Component	Operationalization	Measurement variable
1. Search Costs	1.1 Buyer information search	1.1.1 Commission agent's fees 1.1.2 Monetary value of time spent to meet traders
2. Negotiation costs	2.1 Packaging	2.1.1 Cost of packing material
	2.2 Loading	2.1.2 Labour wages for packing
	2.3 Transportation	2.2.1 Labour wages for loading
	2.4 Unloading	2.3.1 Cost for moving produce to marketplace
	2.5 Primary processing	2.4.1 Labour wages for unloading at marketplace
	2.6 Quality assessment	2.5.1 Money paid for grading / sorting / cleaning
	2.7 Weighing	2.6.1 Charges for quality testing
	2.8 Wastage	2.7.1 Charges for using weighing facility
	2.9 Transaction time	2.8.1 Monetary value of discounted weight of produce 2.9.1 Time taken for auction
3. Monitoring costs	3.1 Time from auction to payment	3.1.1 Monetary value of time between auction and payment
	3.2 In case of partial payment	3.2.1 Interest on unpaid amount till full settlement
	3.3 Post-transaction quality mark downs	3.3.1 Monetary value of quantity or quality discounting after sale

under negotiation costs, besides monetary value of time taken for auction. Monitoring costs took into account the monetary value of time between auction and payment, interest on balance amount where payment was partial, and post-transaction quality mark-downs. Table 3 presents the parameters taken into consideration for estimating the transaction costs.

Analysis and results

The analysis was conducted in two parts. First, farmer-trader relations were examined to understand the elements that defined the dyadic relations in producer – first handler markets, a necessity considering that these could influence perceived benefit of Ag-EMP. In the second part, marketing

Table 4 Output of factor analysis: item loading on 3 factors

S. No	Variable	Factor 1	Factor 2	Factor 3
1	Reliable information on current prices	0.468	0.369	
2	Requirements of and changes in market and downstream buyers	0.364		
3	Crop production technology information			
4	Reliable information on future price trends	0.323		
5	Provision of packing material			0.423
6	Arrangement of transport to market			0.441
7	Provides grading/sorting facility			
8	Fairness in assessing quality of produce			
9	Appropriate methods of weighing produce			
10	Promptness in payment		0.597	
11	Is fair when payments are staggered			0.392
12	Fair in getting best possible price	0.426		
13	Believes in prosperity of the farmer and his family	0.591		-0.413
14	Believes in continued future, mutually beneficial relationship	0.769		
15	Provision of loan for cropping			0.442
16	Provision of loan for personal purposes	0.401		
17	Loans at lower interest rates than other informal sources			0.570
18	No requirement of collateral / pledge			
19	Provision of loan for emergencies	0.537		
20	Helps with availing government schemes			
21	Helps with work related to government departments			0.347
22	Provides political influence			
23	Is an elected representative in some level of government		0.825	
24	Hails from same village / region as farmer		0.634	
25	Member of same caste / community as farmer		0.706	
Percentage of total variance explained		14.1	15.5	11.1

transaction costs of farmers in the conventional marketplace and Ag-EMP are compared.

Elements of relational marketing

Data obtained from the respondents in the two districts (marketplaces) was evaluated to compare similarity of marketing practices in the two regions. Fisher's p-value, obtained through 2-Proportions test, for 17 of the 25 variables was greater than the chosen $\alpha = 0.05$, rejecting the null hypothesis that the sample charactertistics are not similar. This rendered the combined sample suitable to understand relational marketing in the surveyed areas. The data thus collected for items listed in Table 2 was subjected to exploratory factor analysis (EFA). Although the items were borrowed from existing literature on seller-buyer relations, the difference in context and corresponding modification to the items merited an analysis, to understand and accommodate interplay between the items. Accordingly, an EFA was conducted using polychoric correlations since it yields better theoretical fit and produces more robust measurement models for ordinal data than EFA using Pearson correlation (Holgado-Tello et al., 2009). The variables exhibited "mediocre" common variance, based on Kaiser Meyer Olkin (KMO) value (0.602), which rendered the data "fair" for factor analysis (Comrey & Lee, 1992, as cited in Henson & Roberts, 2006). EFA was performed using varimax rotation with variables loading on three factors. The output, comprising of factor loadings $>= 0.3$, is presented in Table 4. Collectively, the three factors explained only about 40% of the variance, nevertheless, providing reasonable information to indicate existence of relational marketing.

Eight items loaded on the first factor, which represents a mix of those representing commercial aspects and personal relations. The trader is a source of market information (market information, price information and market trends), helps with farm production (agricultural loans), marketing farm produce (best possible price), and exhibits a relation beyond commercial purposes (loan for personal use and emergencies, feels that the farmer should prosper, and wants a long-term mutually beneficial relationship). The second factor comprised of five items, of which three are indicative of kinship and political power, indicating importance of reciprocity in dealings. The third factor includes items that have

more alignment with marketing related aspects (provision of packing material, arrangement of transport, loans for cultivation, loans at low interest rates, reliable payment). The three factors collectively indicate the dependence of farmer on the buyer for various services and benefits, beyond mere marketing transactions.

Comparison of transaction costs

Transaction costs were broken down into three buckets – search costs, negotiation costs and monitoring costs, as shown in Table 3 above. Actual costs incurred in the marketing process, opportunity costs of certain activities, and in-kind expenses converted into monetary components were summed up to arrive at the total transaction costs. Since the data was self-reported by the respondents, it reflects perceptions of costs and efficiency, as hypothesized.

Using Wilcoxon-Mann–Whitney test, median transaction costs of the Ag-EMP were compared with those of the regular marketplace. The alternate hypothesis was that median transaction costs in Ag-EMP are lower compared to those in the conventional marketplaces, the null hypothesis being that the transaction costs in both marketplaces are similar. The observed test statistic (Wilcoxon W) was higher than the critical value at 5% level of significance; consequently, the null hypothesis failed to be rejected. In other words, there was no significant reduction in transaction costs in the Ag-EMP. As regards marketing efficiency, of the different methods available to estimate efficiency in agricultural marketing, Shepherd's method employed calculation of marketing costs, which is quite similar to calculation of transaction costs (Acharya & Agarwal, 2011). Adopting this method, marketing efficiency was estimated as ratio of price obtained by farmers to marketing costs; hypothesizing that marketing efficiency of the Ag-EMP would be higher than that of conventional marketplace. Median marketing efficiencies of the two marketplaces were compared using Wilcoxon-Mann–Whitney test. The resultant Wilcoxon W was greater than critical value at 5% level of significance. On the basis of these results, the null hypothesis, that the marketing efficiency of the Ag-EMP and its physical counterpart were similar, could not be rejected. Findings are summarized in Table 5; and details of the same are discussed in the next section.

Table 5 Transaction costs (Rupees per quintal) and marketing efficiency values

	Physical Marketplace	EMP	Significance at 5% level
Median transaction cost	247.55	279.18	No
Median values of marketing efficiency	18.312	15.644	No

Discussion

Benefits of EMPs, such as assembling distant buyers and sellers on a common virtual platform, disseminating price and product information, and disintermediation, hold promise for smallholders in developing countries. Oligopsonistic market structure, and consequent dependence of the farmer on better-informed and collusive buyers lead to high transaction costs for farmers, which is where EMPs are expected to make a difference. However, an essential step towards this change, according to the Technology Acceptance Model, is that growers ought to perceive the usefulness of Ag-EMP in the form of lower transaction costs. In this paper, an attempt is made to understand if oligopsony and relational marketing influence such perception of usefulness by farmers. Results from analysis show that farmers do not perceive statistically significant reduction of transaction costs in the Ag-EMP against a conventional marketplace. The EFA indicates that traders constitute an important source of information about markets, prices, trends and marketing developments to farmers. Given that the Ag-EMP was in operation for at least a year before the survey, the probability of traders being aware of the processes is very high, especially since their shops exist in the market yard and the bidding process happened on computer systems in the APMC office. The same was also observed while visiting the market yards during the survey. However, since buyers in oligopsonies tend to derive bargaining power out of asymmetrically held information, it appears that they did not share this knowledge with farmers. Further, although farmers depended on traders for market information, they seemed to value the long-term relationship with the traders for other bundled services and benefits, such as credit, packaging material, and a sense of commitment and social connectedness over their need for marketing information.

However, some of the actual processes in the Ag-EMP were clearly more efficient than in the physical marketplace. For instance, e-auctions could attract a larger number of buyers, leading to lower search costs. Similarly, while physical auction took at a least a few hours, the online auction concluded in fifteen to thirty minutes, lowering the transaction time. Finally, the Ag-EMP system was designed to enable electronic payments directly to the farmers' bank accounts. On one hand, farmers, not having witnessed the e-auctions, could not fathom greater buyer participation, nor did they realize the reduction in transaction time. Secondly, traders continued to pay farmers in cash, and often in instalments, sometimes stretched over a few weeks. Consequently, farmers could not observe some remarkable changes the Ag-EMP

had ushered in, and as a result, did not perceive usefulness of the initiative.

While these findings do go against the general notion about EMPs, they are not entirely unfounded. Wang et al. (2006) had found that suppliers or sellers were generally more reluctant than buyers to adopt EMPs, and that sellers often required an institutional stimulus, such as buyer insistence to adopt EMPs. In the same study, Wang et al. (2006) outlined the role of market structure. In fragmented markets, small but similar sized companies adopted buyer-consortia EMPs under duress, on requests of buyers, or with the availability of facilitating conditions. In general, sellers were found to be "more passive in adopting" EMPs than buyers (Wang et al. 2006, p.347). Extending the arguments of Wang et al. (2006), Rask and Kragh (2004) described that there are different motives – efficiency, positioning, legitimacy and exploration – for buyers and sellers to participate in an EMP. Efficiency is a motivator for buyers, while legitimacy matters more to sellers. Buyers value the reduction in costs of finding and evaluating sellers and products. Sellers, on the other hand, participate in e-markets for fear of losing out on buyers. In case of consumer goods and other product markets, these findings appear relevant, but in agricultural markets, the relationship between buyers and sellers is dictated by factors beyond pure transactions. Traders resort to uncompetitive practices but extend various services to farmers, whereas the latter usually do not compete among themselves for buyers, but rather have exclusive dealings with traders. Therefore, it is also likely that perception of usefulness to farmer-like sellers in EMPs may arise out of other dimensions than higher efficiency or lower transaction costs.

Unlike other scenarios where the EMPs are often sponsored or introduced by buyers, and sellers are pushed to adopt them, in this case, the EMP was promoted by a third party. Clasen and Mueller (2006) emphasize that in case of a third-party-owned digital marketplace, the marketplace provider ought to frame rules that "constrain buyers' and sellers' propensity for opportunistic behaviour" (p. 351) to engineer a satisfactorily concluded transaction. Although opportunistic behaviour of buyers in this case is, per se, not on account of any lopsided rules, the onus of creating awareness and providing facilitating conditions comes to lie with the public agencies. The role of the Ag-EMP provider assumes greater importance in this scenario, particularly because the EMP is likely to empower sellers vis-à-vis the buyers.

Managerial and policy implications

The idea behind an Ag-EMP, though rooted in the benefits of EMPs, has been a government initiative, as described in the literature review. At a macro level, the policy envisages overall systemic efficiency, which can unfold only when farmers perceive usefulness of the Ag-EMP and accept it. Therefore, it is important to identify the obstructions to perception of usefulness of the Ag-EMP among farmers, develop apposite managerial interventions, and ensure success of the EMP. A first step in this direction is creating awareness about the Ag-EMP by government agencies, rather than leaving it to the buyers in the market yard. Communication in such a scenario may preferably avoid theoretical considerations such as transaction costs, and focus on more perceptible matters such as participation of larger number of buyers. Embeddedness of the EMP in the larger marketing system is also important for its success (Fong et al., 1998). For instance, in case of physical auctions, which concluded around noon and farmers received payment by evening, the interim free period was used by farmers to visit nearby places for various household purchases, or entertainment. Thus, farmers did not find extended auction time as a waste; rather they utilized this time productively from their viewpoint. Dynamic bidding process, which is visible on the trading screen, might be more appealing to farmers in this case, than communicating saving of time as an advantage.

Providing facilitating conditions can be another compelling factor for adoption. High priority to customer service (Matook, 2013), and the extent of efficient "business process and systems" infusion in the existing system to replace what are considered outdated marketplace practices (Leroux et al., 2001a, 2001b) are pivotal for success of EMPs. The EMP provider ought to treat farmers and traders as different sets of customers, and offer distinct services. To quote Leroux et al., (2001a, 2001b) the third party will have to combine "supply chain management, electronic data interchanges (EDIs), and physical exchanges" to ensure success of the EMP. Support facilities and infrastructure including efficient and fast certification systems, warehousing, and financing are likely to add value to farmers as well as buyers. Studies indicate that lack of support infrastructure for logistics, technology, collaboration among various players in the system (Xiaoping et al., 2009), institutional limitations (Cloete & Doens, 2008), the amenability of certain products for online sale and so on have constrained the adoption of EMPs in primary farm produce markets. Hence, it may be essential to establish the ecosystem components along with the core information and communication systems, especially when support infrastructure is essential to the functioning of EMPs. Even as the necessary infrastructure is made available, it is vital to not lose focus on communication about the Ag-EMP. The message crafted for farmers may ideally be focussed on the components of the Ag-EMP that make a difference to the growers' perception of benefits.

A systemic perspective encompassing smoother physical exchange may be crucial for small growers to realize

or perceive the benefits of EMP by seller growers. Accordingly, the policy focus may preferably incorporate creating enabling conditions for support infrastructure, and consider involvement of the private sector. The Ag-EMP may be developed as a cornerstone to bring a convergence of rules that concern procurement, processing, retailing and export aspects of farm produce. Further, policymakers may also consider allowing multiple Ag-EMPs to come up, such that a "multiverse" of EMPs offering differentiated and competitive services and facilities is available to smallholders.

Theoretical contribution

Although reduced transaction costs and other business costs are an incentive to businesses for adopting EMPs, this article explores the relatively less-studied seller side and reinforces the occasional idea that lower transaction costs are not necessarily major influencers of adoption of EMPs. In an Ag-EMP, sellers depend heavily on buyers for marketing information, whereas the latter might prefer to withhold advantages of third party EMPs; such opportunistic behaviour adversely affecting the perception of usefulness of the EMP among sellers. The likelihood that reduced transaction costs might be factual, but not significant enough for sellers, particularly in oligopsonies, opens scope for inquiry into the effect of market structures on the purported benefits of EMPs. There may be different factors in an oligopsony which may or may not influence adoption of EMP as a technology by sellers, the crux of which may lie in parameters deciding the dependence of sellers on buyers. Research shows that knowing the elements in the marketing system that influence farmers and their decisions is essential in drafting the communication strategy (Argade et al., 2021), and the same could hold true in the case of Ag-EMPs.

Leroux et al., (2001a, 2001b) had argued that a player intrinsic to the value chain of a commodity might provide substantial gains as compared to a third-party agency in operating an Ag-EMP. This article highlights the role of the marketplace provider when a third party (with little interest in buying or selling) operates and governs the EMP. As such, this article raises pointers to the roles and responsibilities of the third party when it operates EMPs.

Having underscored the importance of support infrastructure to establish the perceived usefulness of the Ag-EMP to farmers, this article adds credence to the EMP definition proposed by Stockdale and Standing (2004), where an EMP is "an interorganizational information system that allows multiple buyers and sellers, and other stakeholders, to communicate and transact through a dynamic central market space, supported by additional services" (p. 302).

Limitations and scope for future research

Oligopsony and relational marketing are not unique to agricultural markets, though they assume importance when viewed from the perspective of improving the lot of smallholders. Though the effects arising out of buyer–seller relations in producer – first handler agricultural markets in adoption of Ag-EMP is evident in this study, there are limitations in straightforward extension of the findings to other industries characterized by similar market structure and buyer–seller interactions. Farmers, and especially smallholders, in developing countries are commonly constrained to obtain market information and downstream value chain requirements of buyers and consumers. The same situation may not apply in other markets where sellers may be small in size, but could have access to sufficient information about consumer needs. Thus, information alone may not be the critical factor in all scenarios. Comparative investigation of EMPs for different products, or markets at different stages of implementation of the EMP model could strengthen the comment on generalizability or specificity of the findings herein.

This study was taken up within around two years of implementation of the Ag-EMP. This might be too short a timeframe for effective communication and spread of information among thousands of farmers, who may be semi-literate or illiterate. Further, since these EMPs were in marketplaces which were not adequately supported by grading and certification infrastructure, buyer participation from across geographies was constrained, and such buyers depended on subjective evaluation of the commodity done by their representatives. Future research under more long-standing and developed Ag-EMPs with requisite support infrastructure may re-examine perceptions of usefulness among farmers as well as buyers.

This study was limited to two marketplaces, in a very narrow geography and the sample was of restricted size due to time and financial constraints, which could introduce a bias in the sample. This imposes a restriction on the generalizability of the findings even within agrarian settings. Dynamics vary from crop to crop, and region to region in agricultural markets, and hence, the findings of this study may be relevance to the specified context. Future research on Ag-EMPs could focus on a wider geography and multiple commodity categories to verify the inferences arrived at in this article.

Conclusion

Situating the context in the theoretical background of the Technology Acceptance Model, this study examines the perception of usefulness of an agricultural EMP among

farmers in terms of reduced transaction costs, in markets characterized by oligopsony, and transactions governed by long-term association with better-informed, but opportunistic buyers. The study compares transaction costs in a regular producer – first handler agricultural marketplace with those in an agricultural EMP in the state of Karnataka, India, to verify if smallholder growers perceive reduction in transaction costs in the latter. An exploratory factor analysis was conducted to identify items that defined farmer-trader relations, which revealed that farmers particularly depended on traders for marketing information, even as trust, a sense of commitment, and social attachment influenced commercial ties between farmers and traders. Transaction costs incurred in marketing cotton in a conventional, physical marketplace were compared with those in an Ag-EMP. Based on extant literature, it was hypothesized that farmers would perceive a reduction in transaction costs in the Ag-EMP. However, results indicated that farmers did not perceive any significant reduction in transaction costs in marketing. This perception could be due to opportunistic behaviour of buyers who may have held back developments related to EMPs from farmers, despite reliance of farmers on the traders for such information. Since the sample was limited to two marketplaces and one commodity, the findings may not be generalizable, until extensive studies report similar outcomes. However, underlining the promise that EMPs hold in farmer-first markets, it is recommended that managerial and policy may be focused towards appropriate communication strategies, besides providing support facilities such as testing, certification, storage, and financing. This paper contributes to extant literature by providing empirical support to reasons for sellers' general hesitation for adopting EMPs. It empirically strengthens prior studies that suggest creation of facilitating conditions for enabling adoption by buyers. Role of the third party marketplace provider in EMPs and the influence of market structures, especially oligopsony, present opportunities future inquiries in the domain.

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